

Inside Wallops

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NASA Experiment Finds Possible Trigger For Radio-Busting Bubbles Data Obtained from Kwajalein Sounding Rocket Campaign

NASA-funded researchers have identified a possible cause of giant bubbles that often form above the equator in the electrically charged upper atmosphere. These bubbles, manifestations of a phenomenon called "Equatorial Spread-F", disrupt radio signals that must pass through the atmosphere, including those for satellite communications, navigation systems and the global positioning system (GPS).



Credit: Kerry Young

Sounding rocket launch from Roi Namur.

"We believe we have found a new process that triggers the formation of these bubbles. Our discovery could lead to improved forecasts of this phenomenon because we now know what to look for," said David Hysell of Cornell University, Ithaca, N.Y., the experiment Principal Investigator.

The researchers traveled to Roi Namur, Kwajalein Atoll in the Marshall Islands near the equator in the Pacific Ocean to conduct their experiments on a series of sounding rocket launches in August 2004.

A radar facility operated by the U.S. Department of Defense provided the big picture with large-scale observations of the electrified upper atmosphere (ionosphere). A team from NASA Wallops Flight Facility, launched two salvos of instrumented sounding rockets (three each on two different nights) into this region and obtained detailed measurements of the wind speed and direction, the density and the electric fields in a cross-section of the ionosphere. When researchers fed the observations into a computer simulation, the results supported a theory they had developed to explain how the bubbles form.

Wind shears are common in the lower atmosphere where they pose hazards to airplanes. A similar but more complicated phenomenon appears in the upper atmosphere leading to the production of these giant bubbles that mushroom to great heights above the equator.

The scientists discovered a shear flow just below the region in the ionosphere where the bubbles form. The ionosphere above the equator can flow in a westward direction at one altitude and in an eastward direction at another altitude due to forcing by prevailing neutral winds. The shear set up by these oppositely directed flows is unstable and the flows begin to ripple, producing waves that act as seeds that

grow into the enormous Equatorial Spread-F bubbles. This scenario is fully supported by the Kwajalein experiments.

The idea that bubbles in the ionosphere could be responsible for radio communication disruptions was developed in the mid-1970s, but until now, none of the theories proposed to explain the bubble formation have been conclusively demonstrated to work.

They appear almost 250 miles above Earth where the electrically charged gas (plasma) in the ionosphere is densest, forming towering plumes covering several miles.

"Sounding rocket experiments are a good way to do this kind of science, because they are modest experiments that give an initial test of your theory, allowing you to refine your ideas and focus your efforts before a much more expensive satellite is launched," said Hysell.

Researchers will test their theory further with the Communications and Navigation Outage Forecast System, a U.S. Air Force satellite currently scheduled for launch in 2008. The team includes Hysell, Miguel Larsen at Clemson (S.C) University; Charles Swenson at Utah State University in Logan; and Timothy Wheeler at Pennsylvania State University, University Park, PA.

Wallops Flight Facility Selected as Launch Site For Air Force Satellite

NASA Wallops Flight Facility has been selected by the Space and Missile Systems Center's Detachment 12 as the launch site for the Air Force Research Laboratory's TacSat 2 satellite. The launch is scheduled for November 2006.

The satellite will be launched on an Air Force four-stage Minotaur I space launch vehicle contracted through Orbital Sciences Corporation's Launch Systems Group.

The mission will be conducted from the Mid-Atlantic Regional Spaceport (MARS)

launch pad on the south end of Wallops Island.

"Wallops Flight Facility has a 61-year heritage of providing fast response launch services to government, academia and commercial organizations. We are very pleased to be able to support this Air Force mission," said Jay Pittman, chief of the Range and Mission Management Office.

Wallops also will be the launch site for a Minotaur I rocket carrying the Near-Field Infrared Experiment (NFIRE) satellite in 2007.

Wallops Shorts.....

Antenna Field Construction

Site work continues on the Dynasonde antenna field with an expected completion date of August 17.

All three towers are now up and can be seen by looking to your left while entering the Wallops main gate.

This system is a dramatic extension of Wallops' ability to provide world-class ionospheric energy data to experimenters. Expected users include NASA, the Department of Defense, and the National Science Foundation.

Above Average Rainfall Continues Through July

by Bob Steiner, Meteorologist

The average temperature for July was 78.3 degrees, which is 1.4 degrees above normal. We experienced 21 days with average or above temperatures. Temperatures reached 90 degrees or above on 8 days. The 93 degree readings on July 17, 28 and 31 were the warmest days of the month. A reading of 93 degrees on the 31st tied a daily record high for the date. No record highs were set. Minimum temperatures were at or above normal on 24 nights. The coolest nights were on the July 8 and 9 with a recorded low of 62 degrees. No record lows were set or tied.

Measurable rain fell on ten days during July, which is average. The total measured rainfall was 5.09 inches, 1.53 inches above normal. The greatest 24 hour total rainfall was 2.45 inches recorded from mid-day on the July 21 to mid-day on the July 22.

Winds of 30 mph or greater were recorded on four days during the month with a reading of 39 mph at 12:02 a.m., July 22 being the strongest.

NACA Wallops Employee Dies

Robert T. Holdren III, 85, of Pocomoke City, died Monday, July 31, 2006 at Peninsula Regional Medical Center in Salisbury, Md.

Holdren was a graduate of the Apprentice School in Newport News, Va., and a decorated World War II combat infantryman veteran, serving in the European Theater. He was the recipient of many awards including two Purple Hearts and two Bronze Stars.

After an honorable discharge from the military, Holdren began a career with the National Advisory Committee for Aeronautics, (NACA), predecessor of the National Aeronautics and Space Administration, (NASA), at Langley Field, Va., and later at Wallops Island, Va. The NACA became NASA in 1958, and Holdren became head of the Technical Support Branch and later was named head of the Range Support Branch.

Holdren is survived by his wife of 62 years, Nancy Perkins Holdren; a son, and a granddaughter.

Summer is nearly half over, so we can look towards cooler temperatures in September. Highs average 81 degrees at the first of September falling nearly 10 degrees, on average, by the end of the month. Nights become more comfortable with lows getting down to 66 degrees early in the month decreasing to 55 by the end of the month. The record high for September is 96 degrees recorded on the September 11, 1983. The record low for the month was a 40 degree reading on Sept. 30, 1970.

We can expect measurable rain to fall on eight days during September with an average monthly total of 3.42 inches. The wettest September on record was in 1998 when 9.78 inches were recorded. The wettest day on record in September is September 10, 1971, when 4.43 inches of rainfall was recorded!

Remain alert to tropical storm and hurricane activity. September is one of the most active months of hurricane season. With only three named storms so far this year, we may find ourselves becoming complacent.

LobsterFest

August 18, 2006
Building F-3
\$16 per person



Rocket Club Opens at 4:35 p.m.
LobsterFest Begins at 5:30 p.m.

Tickets are available at the Exchange in E-2 and at the Rocket Club in F-3. Only 60 tickets will be sold - first come, first served!

Goddard Digital Library

Through Goddard's network, using a Virtual Private Network (VPN) account, you can easily access all the electronic resources provided by the Goddard Library, including the same Library subscriptions that give you transparent journal access to more than 1,000 full-text scientific and technical journals, approximately 100 different databases, and numerous electronic books.

All of these resources are available at <http://library.gsfc.nasa.gov/center/>.

Range Activity

NASA WFF Range and Mission Management Office supported 24 successful flights on an AirStar Unmanned Aerial Vehicle (UAV) over a three day period from the 1,500 foot UAV runway on Wallops Island for NASA Langley Research Center's Generic Transport Model, (GTM), Autonomous Flight Control System testing.

Networking Brown-Bag Lunch

August 9

11:30 a.m. to 12:45 p.m.

Building E-2, Williamsburg Room

Join Debbie Fairbrother, engineering technologist, (below) as she presents an overview of the Balloon Program Office and discusses ballooning on Mars.



NASA Photo

For further information, contact Jessica Thompson at x1080.

Security Reminder

NASA civil servants and contractor employees are reminded that the removal from Wallops Flight Facility of any Government-owned equipment shall be documented with a Center loan agreement.

Loans not to exceed 30 days may be documented using a Property Removal Permit (NASA Form 892). Loans exceeding 30 days, but less than 180 days, will be documented using an Employee Loan Agreement (NASA Form 232) between NASA and the borrowing employee.

The borrowing employee shall possess valid documentation of the existing loan when removing the property from Wallops.

Refer to NPD 4200.1, NASA Equipment Management Manual for further information or contact the NASA/Security Office at x1111.

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